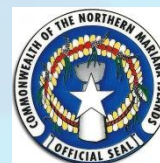
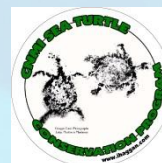
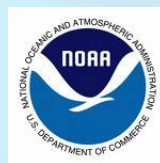
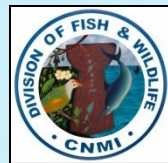


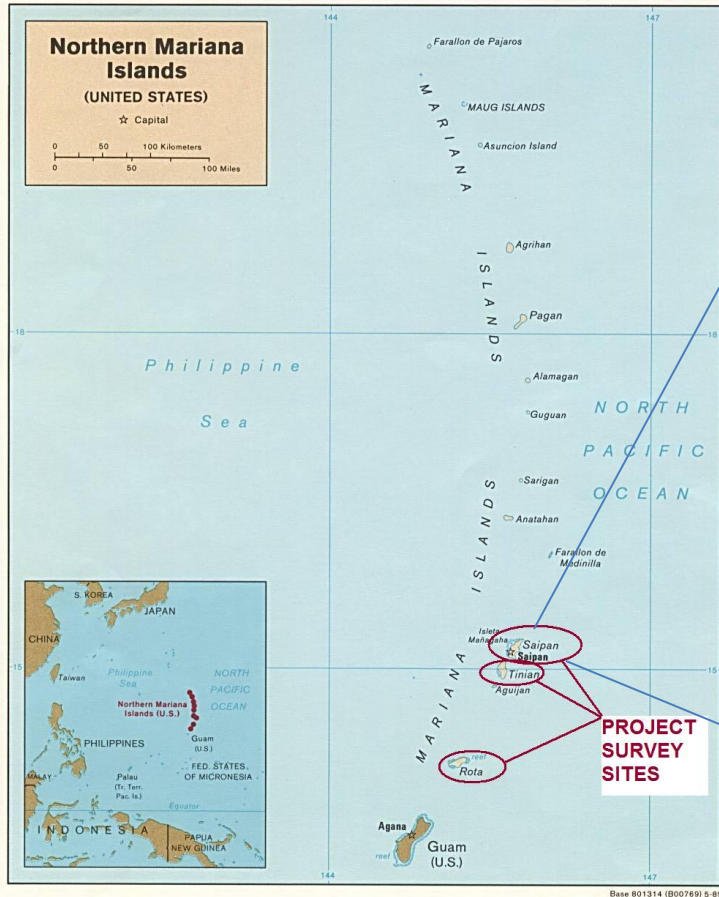
Monitoring of Green (*Chelonia mydas*) and Hawksbill (*Eretmochelys imbricata*) Sea Turtles in the Commonwealth of the Northern Mariana Islands, Western Pacific

By: Tammy M. Summers

Jessy J. Hapdei, Joseph R. Ruak, and Jessy Guererro



Project Survey Site Locations



Coral reefs of Saipan Commonwealth of the Northern Mariana Islands

Goal

The background of the slide is a light blue gradient with a faint, semi-transparent image of sea turtles swimming underwater. One turtle is visible in the upper half, and another is in the lower half, both moving towards the right.

- to capture and tag sea turtles in foraging areas of the CNMI in order to assess the basic ecology of near-shore populations
- to use satellite telemetry to track sea turtles nesting on CNMI beaches in order to assess migratory pathways of nesting populations

Objectives

- to characterize the size class distribution, growth rates, habitat utilization, behavior, diet, stock structure, threats, and site fidelity of a foraging aggregation of green and hawksbill sea turtles in near-shore habitats of the southern CNMI region
- to identify foraging locations, migration routes, and threats of a nesting aggregation of green sea turtles of the southern CNMI region

Methods

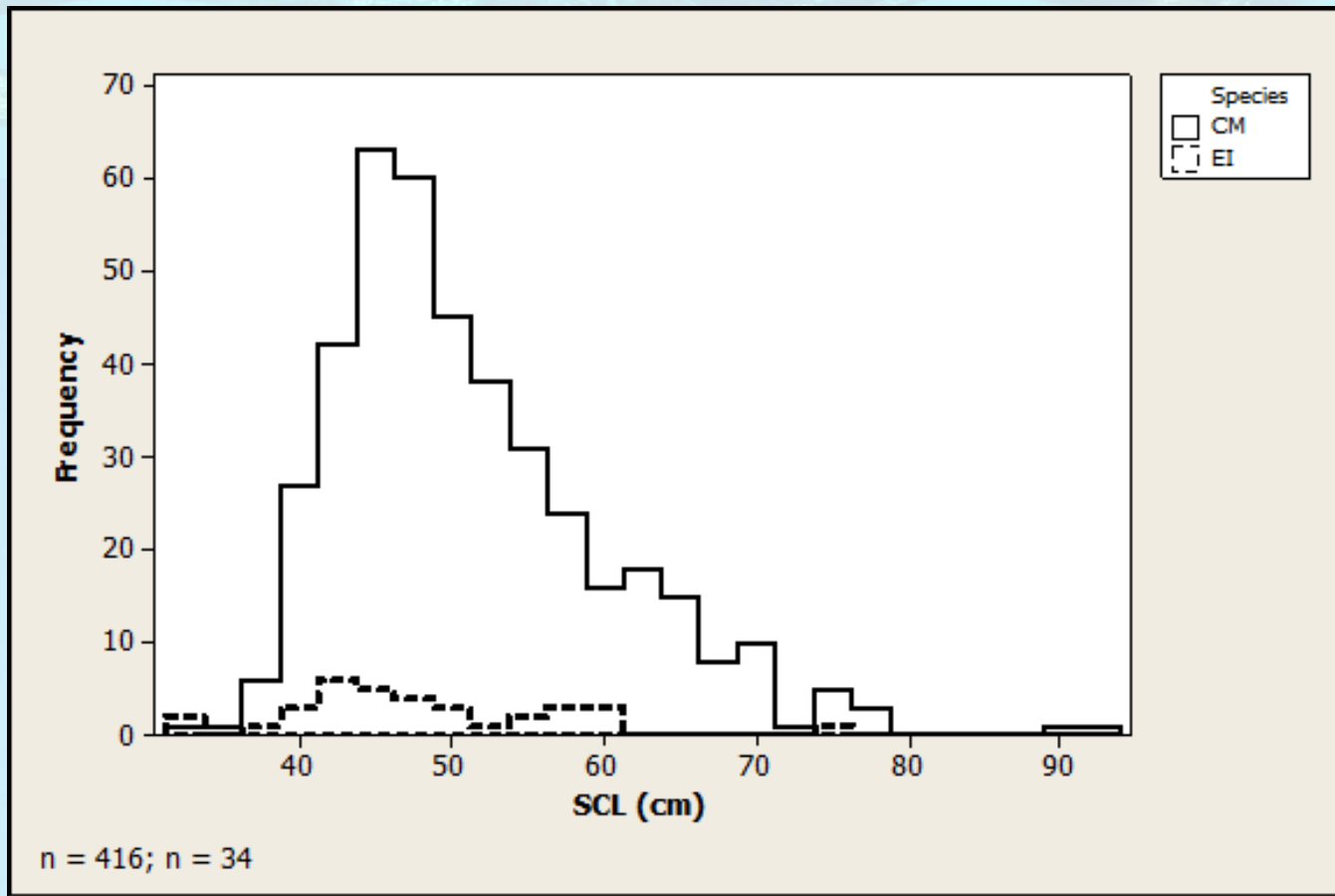
- Near-shore juvenile foraging population:

Capture location, depth, and activity at capture were recorded for each turtle

Mark-recapture--once onboard the boat, turtles were:

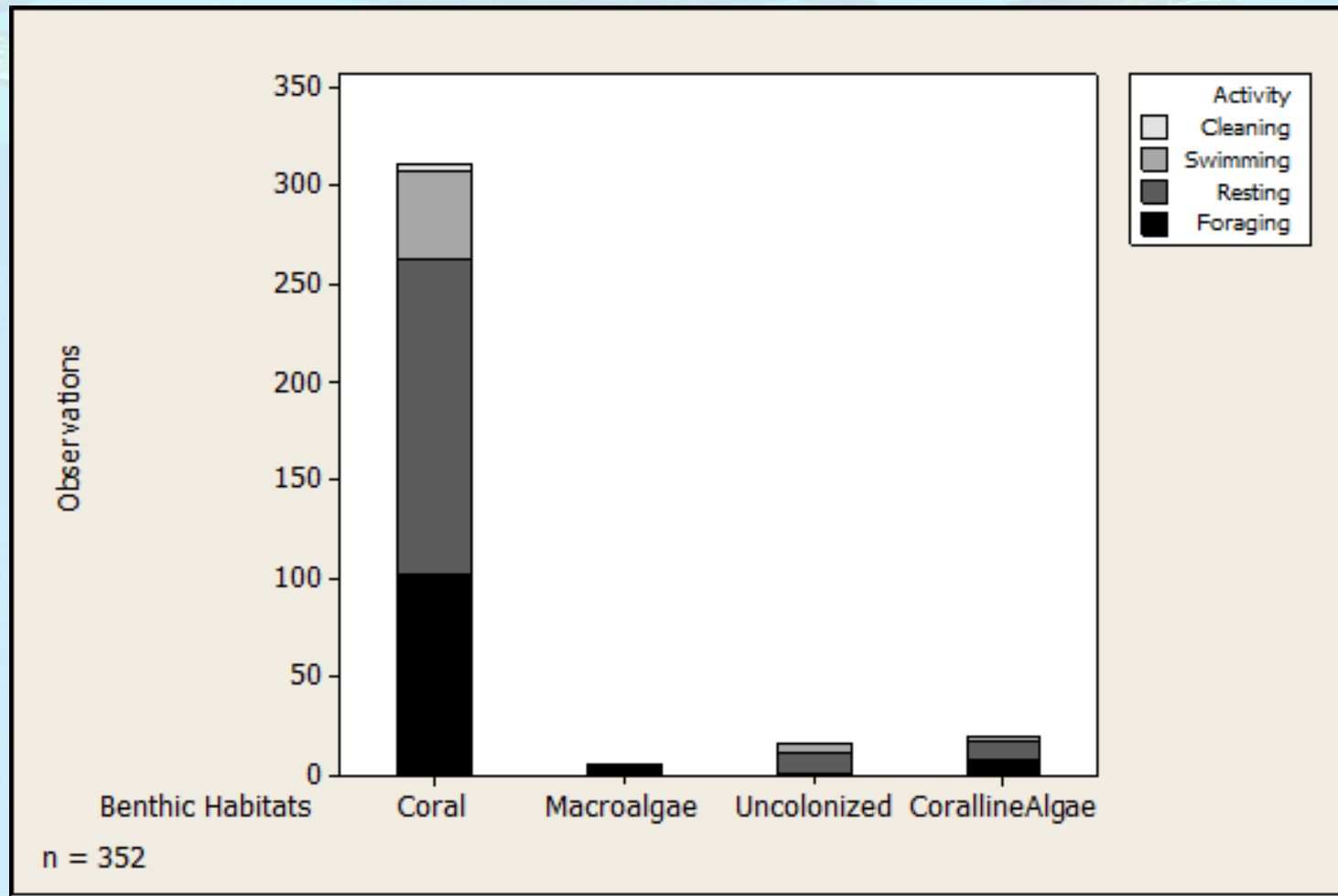
- ✓ flipper tagged
 - ✓ passive integrated transponder (PIT) tagged
 - ✓ tissue biopsied
 - ✓ measured curved carapace length & width
 - ✓ measured straight carapace length & width
 - ✓ weighed
 - ✓ photographed
 - ✓ sampled forage material opportunistically
 - ✓ released near capture location
-
- Adult nesting population:
- ✓ Deployed satellite tags (model #'s TAM-4410 & TAM 4510)
 - ✓ Flipper/PIT tagged and measured nesting females during night surveys and monitored nests and crawls during morning surveys

Results



Length frequency distribution Straight Carapace Length (SCL) for green and hawksbill turtles captured in CNMI from August 2006 to March 2013.

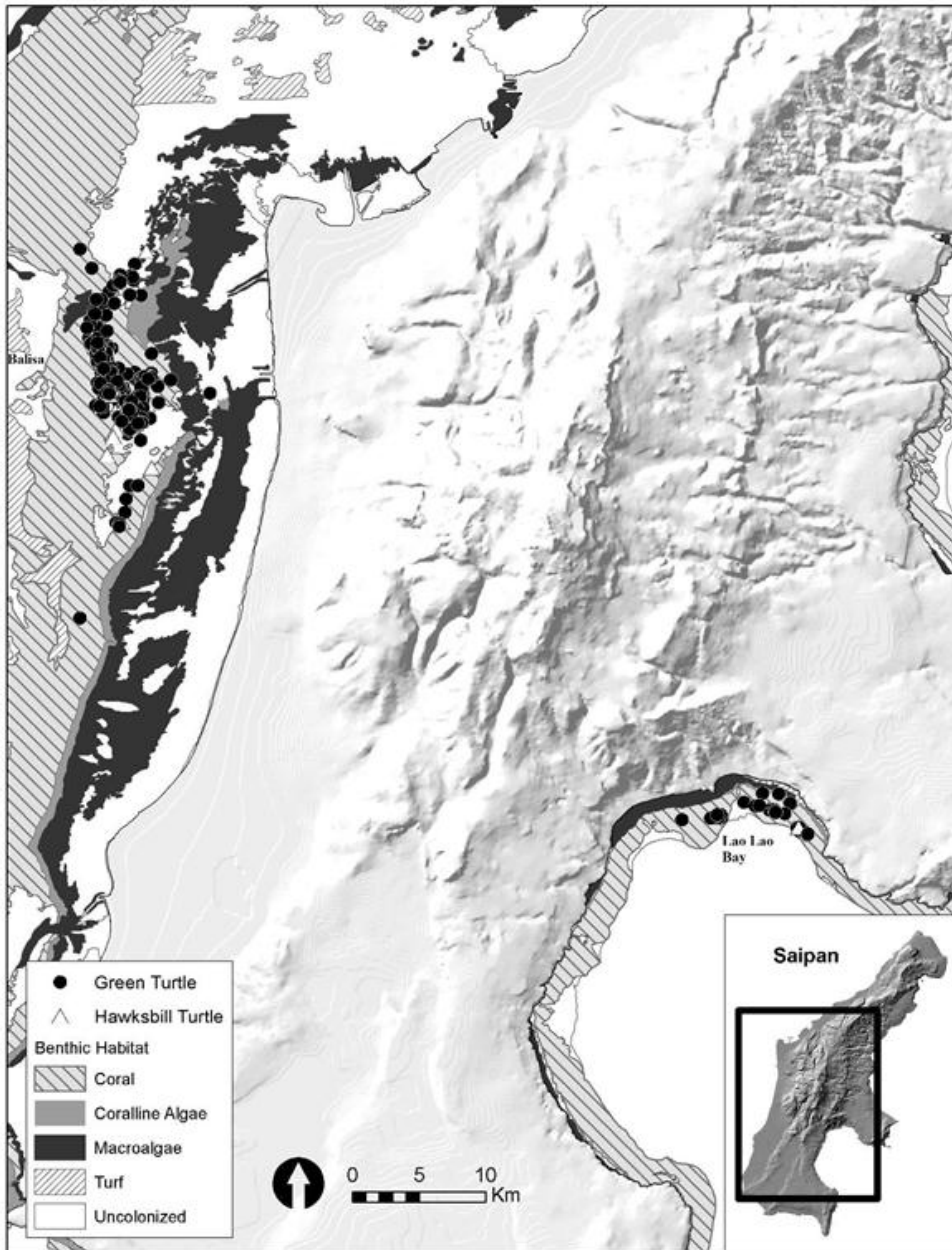
Results



Turtle activity in relation to benthic habitats (data for Saipan, Tinian, and Rota combined).

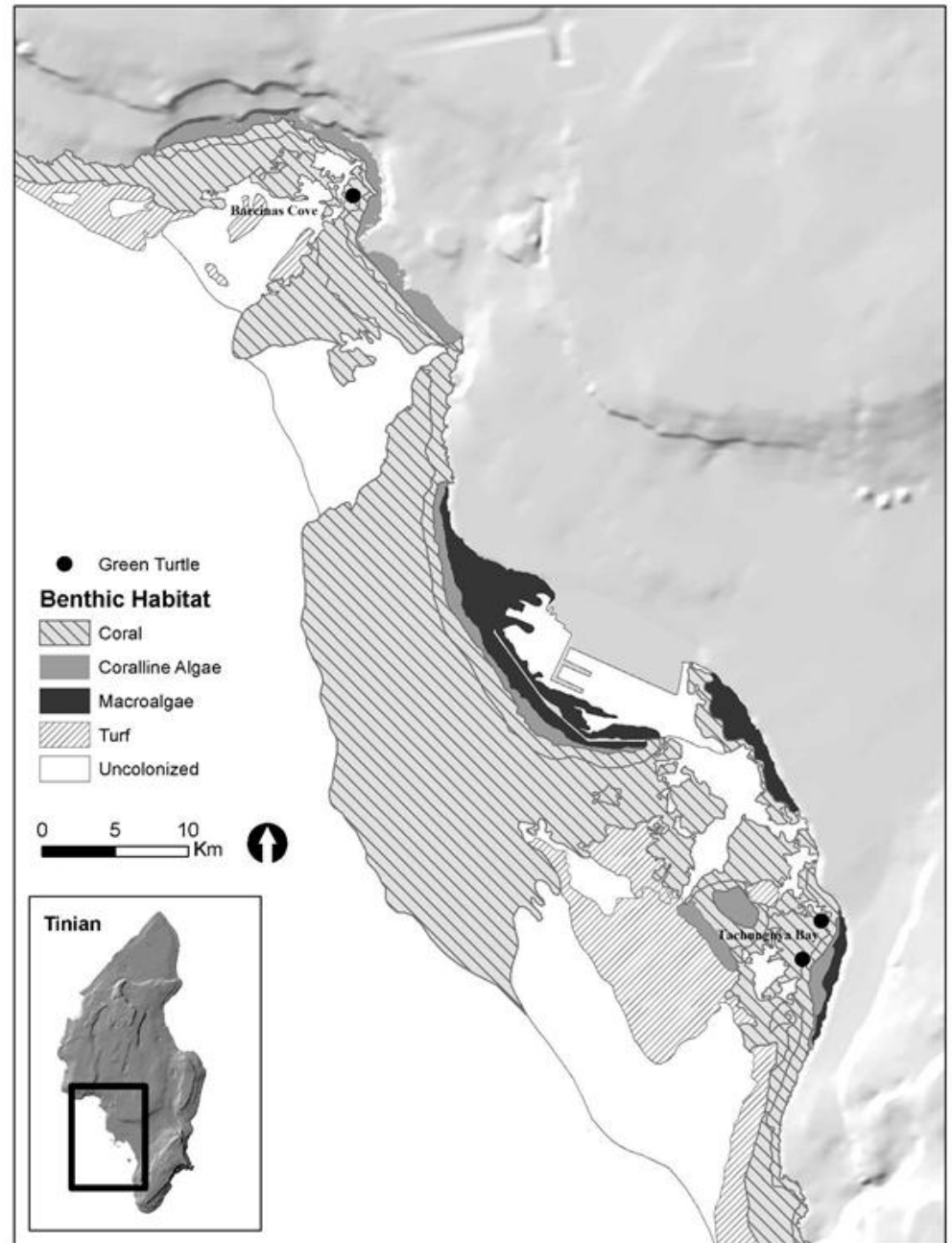
SAIPAN

- Near shore captures in relation to benthic habitats of Saipan
- Habitat use results by turtles (n = 416):
86.06% coral, 5.77% coralline algae, 5.53% uncolonized (sand)
2.16% macroalgae, and 0.48% seagrass



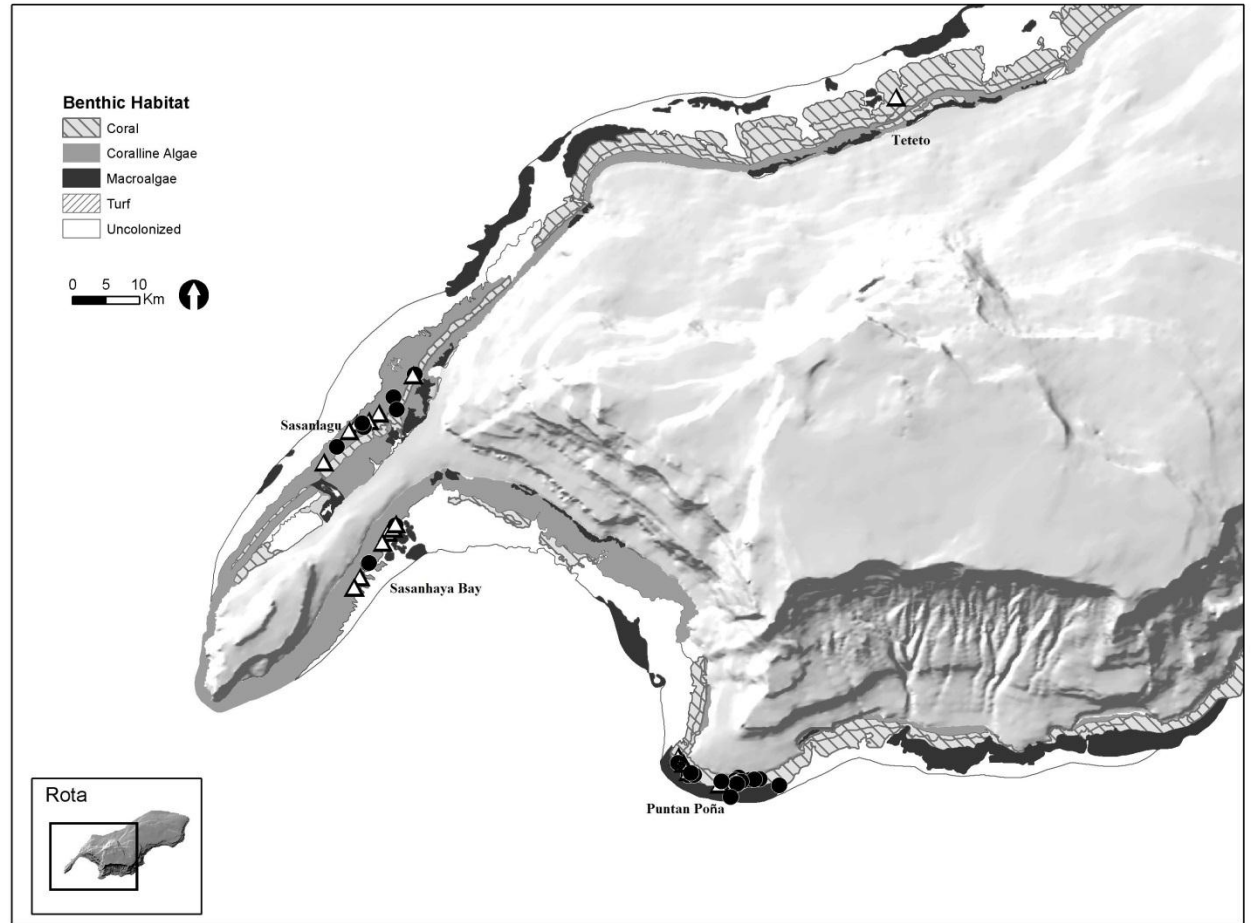
TINIAN

- Near shore captures in relation to benthic habitats of Tinian
- Habitat use by turtles (n = 3) results: 100% coral



ROTA

- Near shore captures in relation to benthic habitats of Rota
- Habitat use by turtles (n = 43): 51.16% coralline algae, 37.21% coral, and 11.63% macroalgae



Algae and seagrass identified as forage

- *Amansia rhodantha*
- *Amansia glomerata*
- *Gelidiella acerosa*
- *Gelidiella myrioclada*
- *Hypnea spinella*
- *Pterocladia caloglossoides*
- *Laurencia* sp.
- *Halodule uninervis*



Amansia glomerata (C.Agardh)



Halodule uninervis (Forsskål) Ascherson

Recapture growth rates

- Absolute growth rates (GR) calculated using:

$$GR = (LR - LC) / T$$

Saipan green turtles (n = 27)

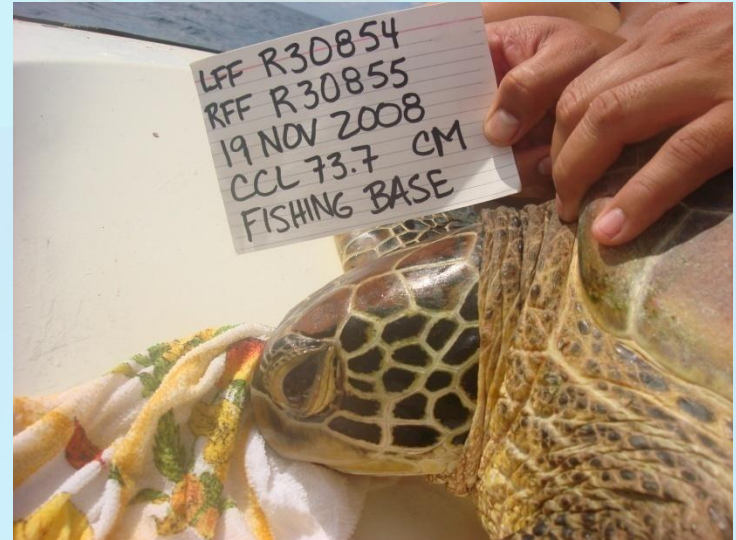
- Ranged from 1.31 cm/yr to 5.76 cm/yr (mean = 3.55 cm/yr)

Saipan hawksbill turtle (n = 1)

- 4.4 cm/yr

Rota green turtles (n = 2)

- 0.81 cm/yr and 1.14 cm/yr (mean = 0.976 cm/yr)



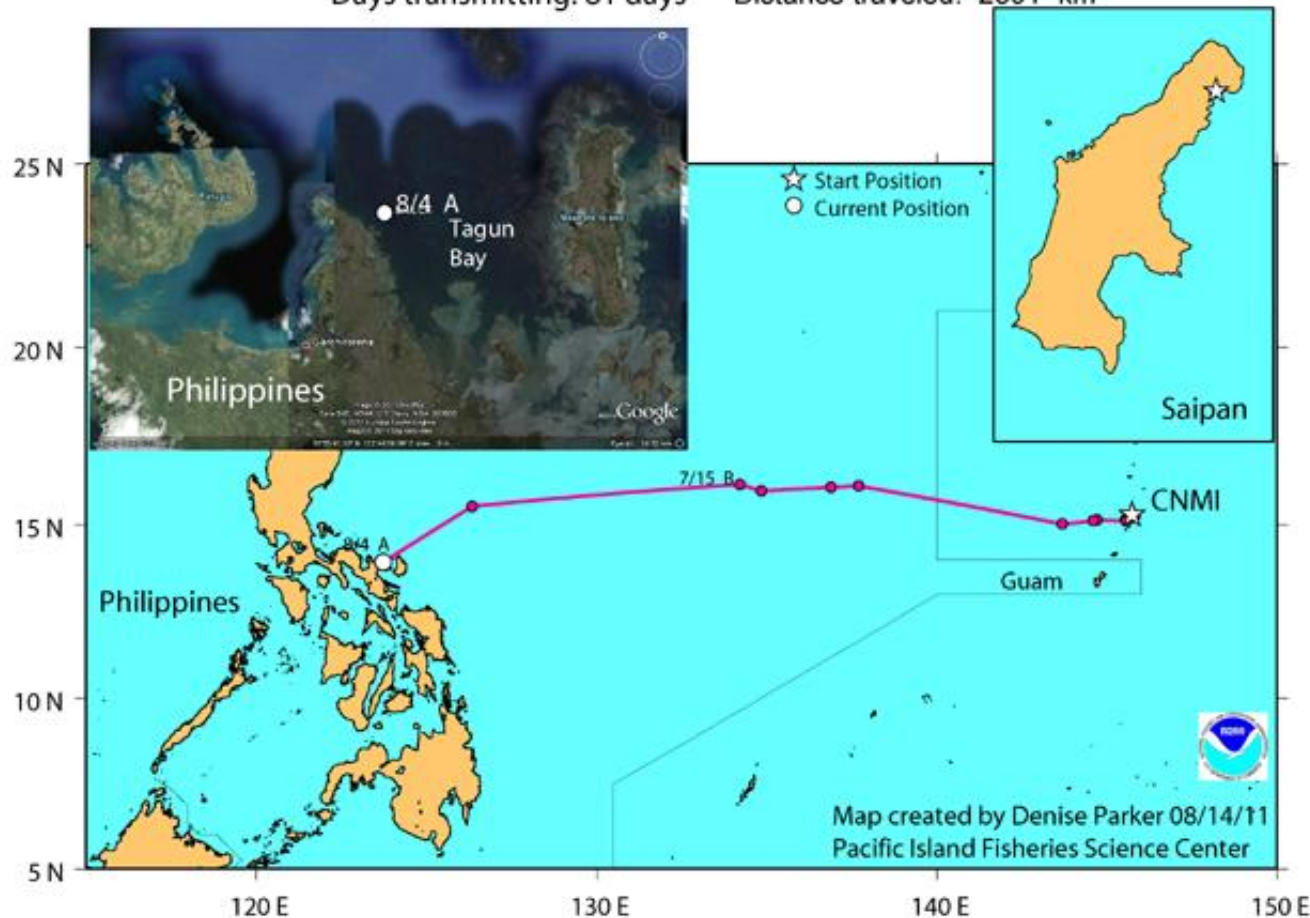
Preliminary DNA/Stock Structure Results



- CNMI immature **foraging** turtles related to nesting populations found in the Marshall Islands and Yap State, Federated States of Micronesia
- CNMI adult **nesting** turtles are related to populations in Guam, Palau, Federated States of Micronesia, Melanesia, Taiwan, and Australia.

Satellite Tagging Results

FINAL MAP:
2011 post-nesting movement of green turtle, Kumiko, ID 22979
released 24 May 2011 from Bird Island Beach, Saipan
TAM-4410 6/24 SCL: 88.7 cm
Days transmitting: 81 days Distance traveled: 2391 km



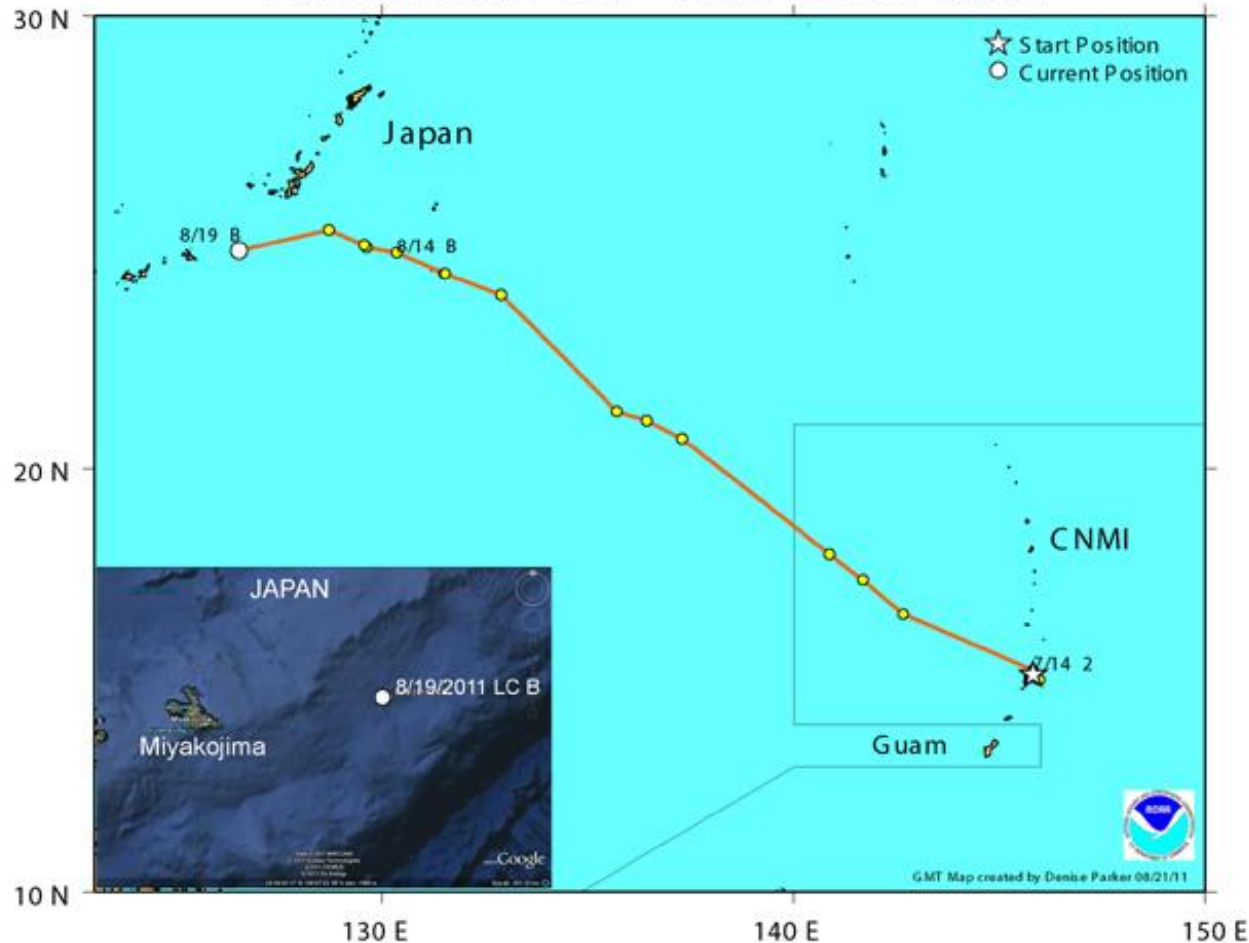
Satellite Tagging Results

FINAL MAP:

2011 post-nesting movement of green turtle, Magas, ID 22981
released from LaoLao Beach, Saipan 30 May 2011

TAM-4410 6/24 SCL: 93.6 cm

Days transmitting: 83 days Distance traveled: 2441 km

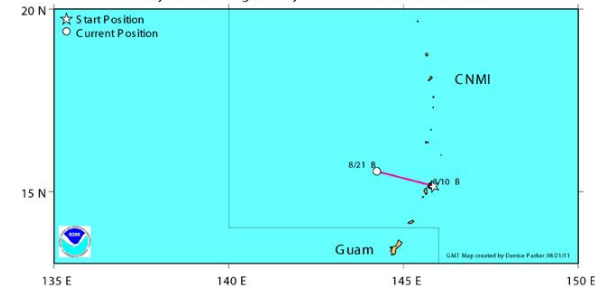


FINAL MAP:

2011 post-nesting movement of green turtle, Limwamway, ID 25313
released from Tank Beach, Saipan 15 June 2011

TAM-4510 6/48 SCL: 97.3 cm

Days transmitting: 67 days Distance traveled: 176 km



"Magas" departing LaoLao Bay with a satellite transmitter.

Result Summary

- CNMI near shore waters provide important developmental habitat for immature turtles
- Preliminary satellite telemetry results suggest CNMI nesting populations are not resident but migrate from/to regions such as Japan and the Philippines
- Greatest current threat to CNMI immature and nesting populations is direct harvest of turtles and eggs

Threats

- Direct harvest of sea turtles and eggs
- Degradation or destruction of foraging and nesting habitats
- Coastal construction
- Non-native vegetation and predators
- Marine debris (entangle/ingest)
- Disease/parasites
- Artificial lighting & increased human presence (beachfront resorts)
- Beach erosion (climate change/typhoons)
- Beach driving
- Incidental fisheries harvest (international/domestic)

Other Research Needs (Wish List)

1. Execute rapid near shore capture-mark-recapture assessments at the northern end of the NMI chain to compare size compositions, growth rates, diet, threats, etc. with those at the southern end.
2. Deploy satellite transmitters equipped with time/depth recorders on northern NMI arc island turtles (>70cm SCL) to track dive behavior and movements
3. Map benthic habitat use (immature population) and migratory pathways (adult population) of northern NMI arc island sea turtles
4. Conduct human dimension study of the CNMI population's understanding of basic sea turtle biology and laws governing their protection to guide education outreach efforts for adult population

Olomwaay-- Si' Yu'os Ma'ase'-- Mahalo--Thank you!



- Commonwealth of the Northern Mariana Islands Department of Lands and Natural Resources, Division of Fish & Wildlife staff
- National Oceanic & Atmospheric Administration, Pacific Islands Regional Office and Pacific Islands Fisheries Science Center (research grants and contract funds)
- Secretariat of the Pacific Regional Environment Programme (flipper tags)
- NOAA Southwest Fisheries Science Center Marine Turtle Genetics Lab (tissue biopsy supplies & lab analysis)
- Sandy Margriter (mapping assistance)
- Ryan Okano of the CNMI DEQ and Dr. Tom Schils of the University of Guam's Marine Laboratory (algae ID)
- This work was accomplished in accordance with U.S. Fish & Wildlife Service cooperative agreement # **TE-017352-15** and National Marine Fisheries Service permit # **15661**.